IN THE CLAIMS:

Please amend the claims below, as follows:

1. (Currently Amended) A method of substantially continuously optimis~~z~~ing a stochastic parameter ϑ that characteriz~~e~~s the instantaneously prevailing readiness with which crop is processed in a harvesting machine, including the step of recursively calculating the optimiz~~e~~d parameter value in accordance with the following algorithm:

$$\hat{\vartheta}(t) = f(\hat{\vartheta}(t-1), \varepsilon(t, \hat{\vartheta}(t-1))) \qquad \text{- (A)}$$

wherein:

$\hat{\vartheta}(t)$ is the optimiz~~e~~d stochastic parameter value at time t; and

$\varepsilon(t, \hat{\vartheta}(t))$ is an error prediction function.

2. (Currently Amended) A method according to claim 1, ~~characterised~~ wherein~~in that~~ the algorithm (A) has the form:

$$\hat{\vartheta}(t) = f\left(\hat{\vartheta}(t-1),..., \hat{\vartheta}(t-n_\vartheta), \varepsilon(t),..., \varepsilon(t-n_\varepsilon), t\right)$$

3. (Currently Amended) A method according to Claim 1~~ or 2~~, ~~characterised~~ wherein~~in that~~ the algorithm (A) has the form:

$$\hat{\vartheta}(t) = \hat{\vartheta}(t-1) + \gamma(t) r^{-1}(t) \psi\left(t, \hat{\vartheta}(t-1)\right) \varepsilon\left(t, \hat{\vartheta}(t-1)\right)$$

wherein:

$\gamma(t)$ is a gain term;

$r(t)$ is a scalar approximation of a Hessian $V''(\vartheta)$ in which V is a quadratic error criterion;

$\psi(t,\vartheta)=\frac{d\hat{y}(t,\vartheta)}{d\vartheta}$, in which $\hat{y}(t,\vartheta)$ is an estimation of a value indicative of the effectiveness of crop processing in said harvesting machine, said estimation being based on stochastic parameter ϑ; and

$\varepsilon(t,\hat{\vartheta}(t-1))$ is the difference between the actual effectiveness value *y(t)* and the estimated value $\hat{y}(t,\vartheta)$ based on the previously optimi~~s~~zed parameter $\hat{\vartheta}(t-1)$.

4. (Currently Amended) A method according to Claim 3, ~~characterised~~ wherein~~in that~~ the algorithm (A) includes an estimation of $r(t)$ that is weighted to reduce the influence, on the optimi~~s~~zed parameter values $\hat{\vartheta}$, of past measurements.

5. (Currently Amended) A method according to Claim 3~~ or 4~~, ~~characterised~~ wherein~~in that~~:

said stochastic parameter ϑ is usable in a model for the relation between a value *u(t)* indicative of the feedrate of crop into the harvesting machine and a value *y(t)* indicative of the effectiveness of an operation processing said crop in said harvesting machine; and

said value $\hat{y}(t,\vartheta)$ is an estimation value of the effectiveness obtained by the application of said model to the feedrate values *u(t)*.

6. (Currently Amended) A method according to Claim 5, ~~characterised~~ wherein~~in that~~ said model comprises an exponential function.

7. (Currently Amended) A method according to Claim 6, ~~characterised~~ wherein~~in that~~ said model has the form:

$$\hat{y}(t,\vartheta) = \exp(\vartheta u(t)) - 1 \quad \text{- (B)}$$

8. (Currently Amended) A method according to ~~any of the~~ Claim~~s~~ 5~~ to 7~~, ~~characterised~~ wherein~~in that~~:

said crop processing comprises separating useable crop parts from other plant matter; and

said value *y(t)* is indicative of a flow of useable crop losses in a selected part ~~(13/14)~~ of the harvesting machine.

9. (Currently Amended) A method according to ~~any of the~~ Claim~~s~~ 5~~ to 7~~, wherein~~characterised in that~~:

said crop processing operation comprises separating useable crop parts from other plant matter; and

said value *y(t)* is indicative of a flow of return crop in a selected part ~~(15)~~ of the harvesting machine.

10. (Currently Amended) A method of operating a harvesting machine comprising the steps of:

~~(i)~~ substantially continuously optimi~~z~~sing a stochastic parameter ϑ that characteri~~z~~ses the instantaneously prevailing readiness with which the harvesting machine processes crop; and

~~(ii)~~ substantially continuously adjusting a performance variable of the harvesting machine in dependence on the instantaneous, optimi~~z~~sed value $\hat{\vartheta}$ of ~~the~~ said parameter in order to optimi~~z~~se the load of the harvesting machine so as to keep a value *y(t)* indicative of the effectiveness of said harvesting machine below a predetermined value.

11. (Currently Amended) A method according to Claim 10, ~~characterised~~ wherein~~in that~~:

processing the crop comprises separating useable crop parts from other plant matter;

optimi~~z~~sing the load of the harvesting machine comprises optimi~~z~~sing the feedrate *u(t)* of crop into the harvesting machine; and

the effectiveness value comprises losses *y(t)* of useable crop parts.

12. (Currently Amended) A method according to Claim 10 ~~or 11~~, ~~characterised~~ wherein~~in that~~ the step ~~(i)~~ of continuously optimizing a stochastic parameter ϑ includes carrying out the method steps of ~~any of the~~ Claim~~s~~ 1 ~~to 9~~.

13. (Currently Amended) A method according to ~~any of the~~ Claim~~s~~ 10 ~~to 12~~, ~~characterised~~ wherein~~in that~~ the step ~~(ii)~~ of adjusting a performance variable of the harvesting machine occurs in dependence on the output of an inverted form

of a yield loss estimation function:

$$\hat{y}(t,\vartheta) = \exp(\vartheta u(t)) - 1, \quad \text{- (B)}$$

14. (Currently Amended) A method according to ~~to any of the~~ Claims 10 ~~to~~ ~~13~~, ~~characterised~~ wherein ~~in that~~ adjusting a performance variable comprises adjusting the travel speed of said harvesting machine or the actual cutting width of a header of said harvesting machine.

15. (Currently Amended) A method of mapping one or more field lots for variations in a stochastic parameter ϑ that characterizes the instantaneously prevailing readiness with which crop is processed in a harvesting machine, the method comprising the steps of:

~~(i)~~ operating a harvesting machine to harvest crop in a ~~said~~ field lot;

~~(ii)~~ simultaneously measuring the machine load and the machine effectiveness and determining the position of the machine in the field lot;

~~(iii)~~ storing data indicative of the position of the harvesting machine at time *t*;

~~(iv)~~ using the measured machine load data *u(t)*, and machine effectiveness data *y(t)* in an optimization of ~~the~~ said parameter ϑ; and

~~(v)~~ mapping the optimized parameter values $\hat{\vartheta}$ obtained from the step of using the measured machine load data *u(t)* and machine effectiveness data *y(t)* in an optimization of said parameter ϑ; ~~(iv)~~ so as to produce a parameter map of the field lot.

16. (Currently Amended) A method according to Claim 15, ~~characterised~~ wherein~~in that~~ the step of using the measured machine load data *u(t)* and machine effectiveness data *y(t)* in an optimization of said parameter ϑ ~~(iv)~~ includes carrying out an optimi~~z~~sation according to ~~any of the~~ Claim~~s~~ 1~~ to 9~~.

17. (Currently Amended) A method of operating a harvesting machine comprising the steps of:

~~(i)~~ substantially continuously optimi~~z~~sing a stochastic parameter ϑ that characteri~~z~~ses the instantaneously prevailing readiness with which the harvesting machine separates useable crop parts from other plant matter; and

~~(ii)~~ sending a display signal, that is indicative of the instantaneous parameter value $\hat{\vartheta}$, to a display device.

18. (Currently Amended) A method according to Claim 17, ~~characterised~~ wherein~~in that~~ the step ~~(i)~~ of optimi~~z~~sing a stochastic parameter ϑ includes carrying out the method of ~~any of the~~ Claim~~s~~ 1~~ to 9~~.

19. (Currently Amended) A method according to Claim 17~~ or 18~~, ~~characterised~~ wherein ~~in that~~ the display signal indicates an abnormal parameter value $\hat{\vartheta}$.

20. (Currently Amended) A m~~M~~ethod~~s~~ according to Claim 1 ~~any of the preceding claims~~, ~~characterised~~ wherein~~in that~~ said harvesting machine is a combine harvester and the crop is a grain-bearing plant.

21. (Currently Amended) A m~~M~~ethod~~s~~ according to Claim ~~8 or 9 or to any other Claim referring thereto~~, ~~characterised~~ whereinin ~~that the~~ said selected part of the harvesting machine is ~~selected from~~:

the straw walkers ~~(13)~~;

the rotary separator;

the sieves ~~(14)~~;

the grain elevator;

the return flow system ~~(15)~~;

the cleaning section; or

the axial threshing and separating rotor;

of a combine harvester.